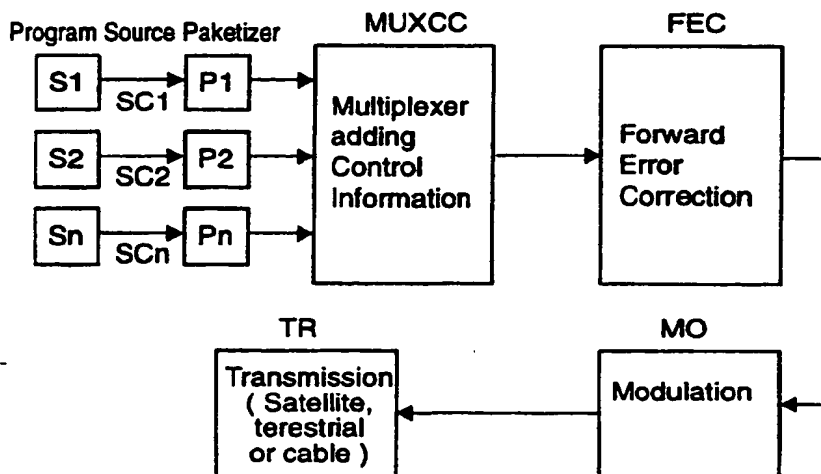


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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: <b>PCT/EP94/00287</b> (22) International Filing Date: <b>2 February 1994 (02.02.94)</b> (30) Priority Data: 93400343.5      11 February 1993 (11.02.93)      EP (34) Countries for which the regional or international application was filed: <b>FR et al.</b> (71) Applicant (for all designated States except US): <b>THOMSON CONSUMER ELECTRONICS S.A. [FR/FR]; 9, place des Vosges, La Défense 5, F-92400 Courbevoie (FR).</b> (72) Inventor; and (75) Inventor/Applicant (for US only): <b>GÜTLE, Hubert [DE/DE]; Alte Dorfstrasse 5, D-77770 Durbach (DE).</b> (74) Agent: <b>WÖRDEMANN, Hermes; Deutsche Thomson-Brandt GmbH, Patents and Licensing, Göttinger Chaussee 76, D-30453 Hannover (DE).</b>			(81) Designated States: <b>CN, JP, KR, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</b>  <b>Published</b> With international search report.

(54) Title: **MULTI-MEDIA DISTRIBUTION AND MULTI-MEDIA PLAYER**

## (57) Abstract

The invention relates to a consumer or professional device, a so called "Multi-Media Player (CDMM)", its application and a method for the distribution of Multi-Media documents. The invention is characterized in that said multi-media documents in form of digital signals are fed into a multiplexer/coder (MUXCC) by several sub-channels (SC1, SC2, ..., SCn), said sub-channels are multiplexed in time, a control signal is added and this signal is modulated into a transmission signal (TR) on the broadcasting studio side and at the receiving side the transmission signal (TR) is treated up to the output of a tuner like a normal signal for television, said signal is demodulated, digitized, demultiplexed and the control information of the control signal is extracted from the bit stream so that by monitoring said control information signal provided with the transmission a transmission channel decoder (TCD) causes a multi-media player (CDMM) to record a distributed document according to the programming of the user or said signal is directly stored by a multi-media player (CDMM) and said stored signal is demodulated, digitized, demultiplexed and the control information of the control signal is extracted from the bit stream so that by monitoring said control information signal provided with the transmission a transmission channel decoder (TCD) causes a reproduction device for reproducing a distributed document according to the programming of the user.

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## MULTI-MEDIA DISTRIBUTION AND MULTI-MEDIA PLAYER

The present invention relates to simultaneous transmission of several different information via a television channel in the manner of multi-media-distribution and the recording and reproduction of multi-media-documents.

So called multi-media-documents are electronic documents which consists of :

- text
- still pictures
- graphics
- digital sound
- digital video
- any combination of the above mentioned kinds of data.

It is already known to use picture-in-picture television receivers and video text for providing different information. But the number of different information which may be transmitted by a normal television channel is restricted by bandwidth of television signal.

Transmission of digital television signals via direct broadcast satellite system (DBS), based on digital compression techniques, is also under development. Such a system can transmit digitally compressed video and audio signals and , optionally, associated control/conditional access data by means of satellite transmission. A large number of transmission channels with a net data rate between 20 to 30 Mbits/sec are provided. To compress video and audio the MPEG I algorithm (motion picture expert group) is used.

Therefore it is the task of this invention to build up a system which enables the distribution, recording and playback of a multiple of multi media documents with low costs.

This problem is solved as described in claims 1 and 7. More details are stated in the subclaims.

The invention is based on the idea of using a television channel or parts of the bandwidth of it to distribute simultaneously a multiple of multi media documents, whereas for recording and playback purpose already known devices with additional functionality are used.

The method is that several multi media documents are read into a digital storage device like Compact Disc or in a digital video tape. These digital storage devices serve as a source of digital signals on the sending side. The digital signals are fed in several sub-channels into the multiplexer.

The number of possible subchannels and therefore the number of multi media documents simultaneously distributed is limited by:

- the number of available transmission channels
- the bandwidth of each channel
- and the bitrate for each subchannel.

For instance the following distribution schemes on one channel are possible: (Assumption channel capacity 23.6 Mbit/sec)

Example 1: 16 subchannels at the single Compact Disc (CD) data rate of around 1.4 Mbit/s

Example 2: 3 tv programs subchannels at 6.8 Mbit/s each plus 2 subchannels with each single CD data rate

Example 3: 2 tv program subchannels at 8 Mbit/s each plus 2 subchannels with double CD data rate plus 1 subchannel with single CD data rate.

To transmit several subchannels containing different multi media documents the subchannels are time-multiplexed in the transmission channel.

This has the following advantages :

- flexible usage of the overall channel capacity is possible
- otherwise unused remaining bandwidth within a channel can be used to transmit multi media documents

In accordance with the present invention, there are provided on broadcasting studio side several sub-channels with average bit rates ranging from several kilobits/s up to the whole channel capacity, which are fed into a multiplexer. In the multiplexer the sub-channels are time-multiplexed and a control information is added. Afterwards the data is preferred undergone a channel coding to assure error-free transmission. The final step at the sending side is the modulation into an analogic signal and the emission via the different media, e.g. satellite, cable network or terrestrial distribution.

On the receiving side the signal passes the demodulation, error check and concealment and the demultiplexer after reception via satellite, cable or terrestrial. The demodulator treats only one out of several channels simultaneously. The task of the demultiplexer is to separate the different subchannels in one transmission channel and to extract the control information from the data stream.

As storing devices are two classes possible :

a) A device which records the whole data stream of one channel - this is a digital VCR. The selection between the different subchannels is done at playback time by using the control information included in the bit stream according to the selection of the user.

b) a device which selects and records only one subchannel out of the n subchannels in one transmission channel - this is a disk-based device and called compact disc multi media player.

By monitoring the control information provided with the transmission the transmission channel decoder causes the compact disc multi-media player to record the distributed documents according to the programming of the user.

The transmission channel decoder can be housed in an external box or can be an integrated part of the compact disc multi-media player.

The distribution can be done during the night when free television transmission channels are available or at all times by means of separate channels.

The compact disc multi-media player is a superset of the known CD-I-Player with additional functions. This additional functions are the possibility to use CD-read-only and CD-writeable such as Magneto-Optical-Disc. Further additions are a remote channel interface which offers the possibility for remote storage of multi-media documents on the Magneto-Optical-Disc.

Optionally the compact disc multi-media player is equipped with a smart card reader for access permission or prohibition to the data in the different sub-channels.

A further option is the computer interface for the connection to a computer system.

There are two groups of application in which a compact disc multi-media player can be used.

The first group of applications relates to a first sub-group identical with CD-I-Applications: CD-Digital Audio, CD-Interactive, CD-Photo and CD-ROM and a second sub-group uses the recordable nature of the Magneto-Optical-Disc: CD erasable and the same format as CD, but erasable and recordable and CD for computer use: general purpose high-capacity storage media for personal or home computer.

The second group of applications can be called Electronic Press Applications. Such as there are Electronic Newspapers and Electronic Magazines, catalogues including product information with still pictures or even video sequences, educational software for correspondence course, remote downloading and updating of Point-of-sales and point -of-information stations and remote downloading and updating of databases. It is also based on the recordable nature of the Magneto-Optical-Disc and uses the mass-distribution of multi-media documents with the method described above.

The compact disc multi-media player will be used in the preferable environments:

CDMM and Television and Stereo Set

or

CDMM and Personal or Home Computer.

With almost the same cost as for a CD-I-only Player the CD-Multi-Media Player opens the door to far more applications than what is known as CD-Interactive and becomes a Multi-Media platform for both professional and consumer applications.

More details of the invention will appear through the description of a non-limiting, preferred embodiment illustrated by the accompanying drawings.

In the drawings:

Figure 1 illustrates the distribution concept at the broadcasting studio side.

Figure 2 illustrates the concept at the reception side with the two kinds of storing devices CDMM-Player and digital VCR.

Figure 3 shows a block diagram of a CDMM-Player.

Figure 4 illustrates a configuration CD-Interactive/Recordable.

Figure 5 illustrates a configuration Remote Recording.

Figure 6 shows a block diagram of a digital VCR.

With the multi media system it is for example possible to transmit the content of 3 newspapers, 2 concerts (pure audio) and 2 films simultaneously. Therefore these documents stored in digital form are required at the broadcast studio. For example the newspapers are stored on a computer hard disc, the concerts on digital audio tape and the films on digital video tape.

#### Embodiment CDMM-Player

According to Figure 1 on the broadcasting studio side there are provided several sub-channels SC1, SC2... SCn with either the single or double CD-data-rate are fed into a multiplexer/coder MUXCC. The CD-data-rate is preferably but not limited to 1.41 Mbit/sec. The whole number of CD-data-rate channels is chosen in respect of the bandwidth of the transmission channel.

In the multiplexer/coder MUXCC the sub-channels SC1, SC2,...SCn are time-multiplexed and control information is added. On the whole, the commands and data of the control channel comprise a

document identification, attention that a program will start in y seconds, start of the announced program, end of the program and the encrypting. Certainly this description of the control data is not complete, but lists up the basic features of the control channel. Afterwards the data is undergone a forward error correction FEC to assure error-free transmission. The final step at the sending side is the modulation by modulator MO into an analogical signal and the emission respectively transmission TR via the different media e.g. satellite S, cable network C or terrestrial T distribution.

At the receiving side the signal is fed after reception into the transmission channel decoder TCD.

In the TCD the signal is demodulated, digitized and demultiplexed. Also a error check and concealment is possible. The control information is extracted from the bit stream.

By monitoring the control information provided with the transmission TR the transmission channel decoder TCD causes the compact disc multi-media player CDMM to record the distributed documents according to the programming of the user. Since the compact disc multi-media player CDMM is in a stand-by mode it is necessary to wake it up. This is done by the transmission channel decoder TCD, when it has found a program identification x which matches with the user programming. The number y takes also into account the usage of juke-box-like multi disk players. In the control data there are also means provided to realize an access permission system by encrypting the data at the studio side and by decrypting it with a key on the receiving side.

The transmission channel decoder TCD can be housed in an external box or can be an integrated part of the compact disc multi-media player CDMM.

The distribution can happen during the night when free television transmission channels are available or in separate channels all around the clock.

The compact disc multi-media player CDMM is as shown in Fig.3 a superset of a known CD-I-Player with additional functions. This additional functions are the possibility to use CD-read-only and CD-writeable such as Magneto-Optical-Disc MOD. Further



additions are the remote channel interface RCI which offers the possibility for remote storage of multi-media documents on the Magneto-Optical-Disc MOD.

Optionally the compact disc multi-media player CDMM is equipped with a smart card reader SMR for access permission or prohibition to the data in the different sub-channels SC1, SC2,...SCn.

A further option is the computer interface for the connection to a computer system.

As shown in Fig.4 and Fig.5 there are two groups of application in which a compact disc multi-media player CDMM can be used.

The first group of applications relates to a first sub-group identical with CD-I-Applications: CD-Digital Audio, CD-Interactive, CD-Photo and CD-ROM and a second sub-group uses the recordable nature of the Magneto-Optical-Disc MOD: CD erasable and the same format as CD, but erasable and recordable and CD for computer use: general purpose high-capacity storage media for personal or home computer.

The second group of applications can be called Electronic Press Applications. Such e.g. are Electronic Newspapers and Electronic Magazines, catalogues including product information with still pictures or even video sequences, educational software for correspondence course, remote downloading and updating of downloading and updating of databases. It is also based on the recordable nature of the Magneto-Optical-Disc MOD and uses the mass-distribution of multi-media documents with the method described above.

#### Embodiment DVCR

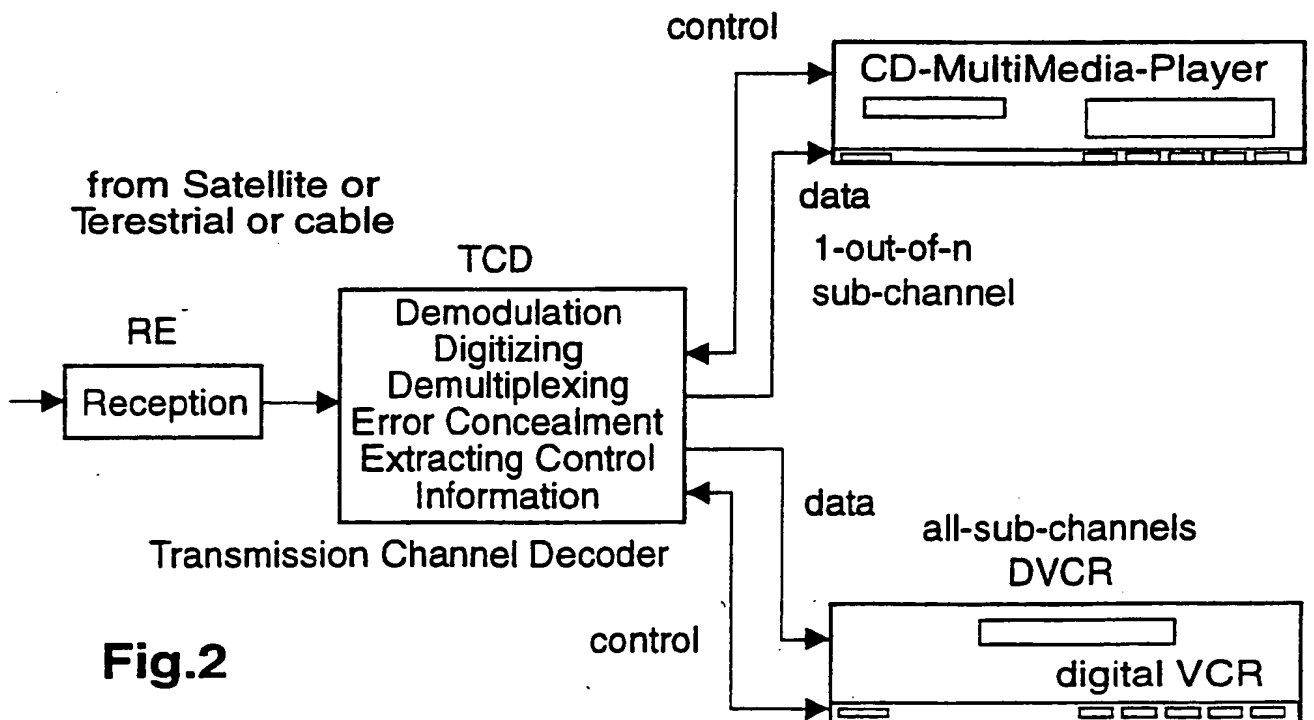
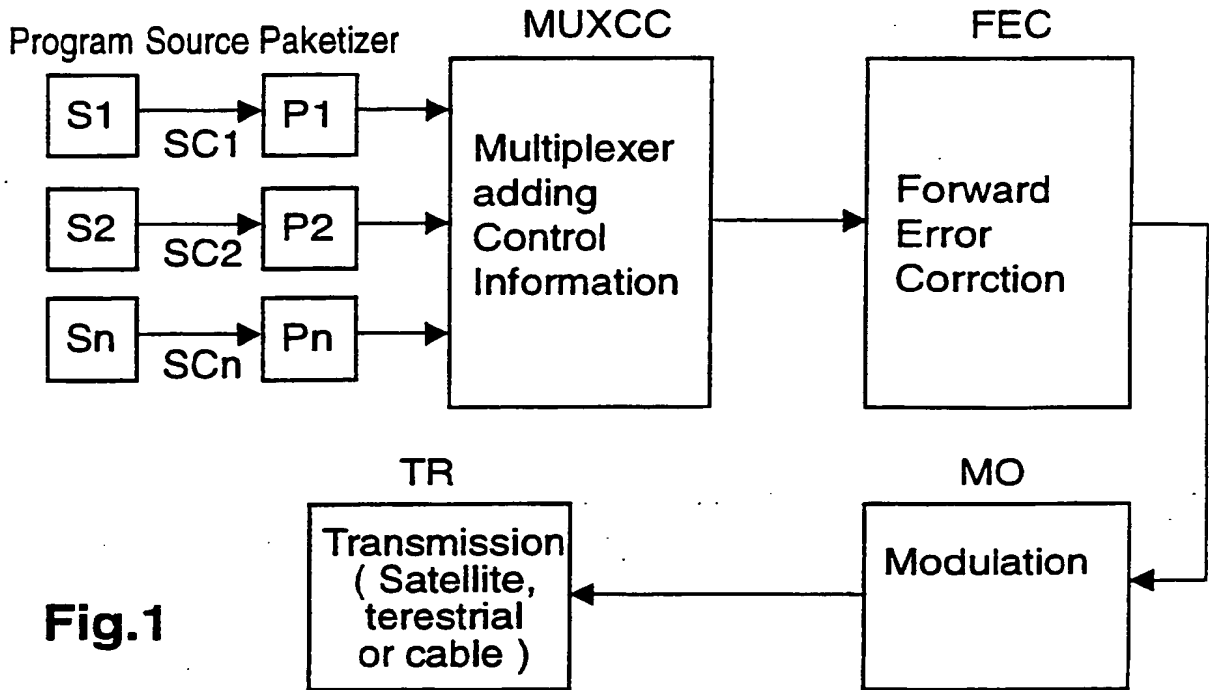
The DVCR uses magnetic tape as storage media and therefore this device is able to store data at a data rate which corresponds to one sub-channel up to the data rate of the whole channel.

## Claims

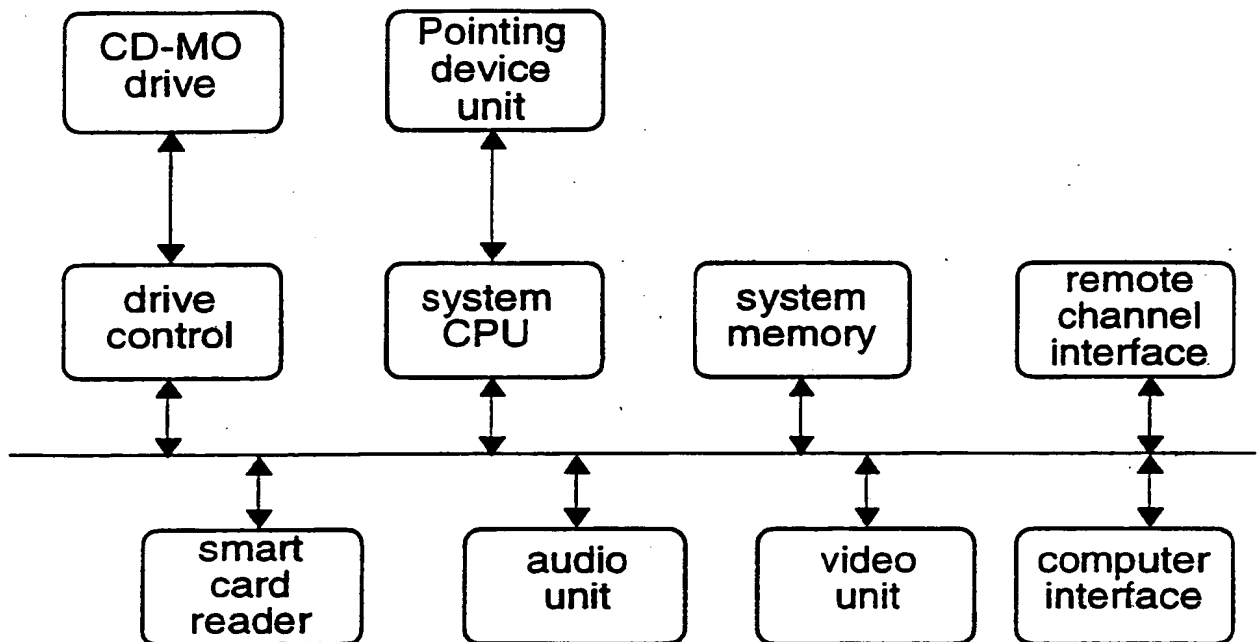
1. Method for distribution of multi-media documents characterized in that said multi-media documents in form of digital signals are fed into a multiplexer/coder (MUXCC) by several sub-channels (SC1, SC2,...SCn), said sub-channels are multiplexed in time, a control signal is added and this signal is modulated into a transmission signal (TR) on the broadcasting studio side and at the receiving side the transmission signal (TR) is treated up to the output of a tuner like a normal signal for television,
  - said signal is demodulated, digitized, demultiplexed and the control information of the control signal is extracted from the bit stream so that by monitoring said control information signal provided with the transmission a transmission channel decoder (TCD) causes a multi-media player (CDMM) to record a distributed document according to the programming of the user or
  - said signal is directly stored by a multi-media player (CDMM) and said stored signal is demodulated, digitized, demultiplexed and the control information of the control signal is extracted from the bit stream so that by monitoring said control information signal provided with the transmission a transmission channel decoder (TCD) causes a reproduction device for reproducing a distributed document according to the programming of the user.
2. Method according to claim 1, wherein said several sub-channels (SC1, SC2,...SCn) with a single CD-data-rate are fed into a multiplexer/coder (MUXCC).
3. Method according to claim 1, wherein said several sub-channels (SC1, SC2,...SCn) with a CD-data-rate according to request of multi-media distribution are fed into a multiplexer/coder (MUXCC).

4. Method according to any of the claims 1 to 3 characterized in that said multi-media player (CDMM) is used as a CD-I-Player and uses the recordable nature of the Magneto-Optical-Disc (MOD).
5. Method according to any of the claims 1 to 3 characterized in that said multi-media player (CDMM) is used for Electronic Press Applications.
6. Method according to any of the claims 1 to 5 characterized in that said multi-media player (CDMM) is used in an environment of a television and radio set or in an environment of a personal or home computer.
7. Arrangement to carry out the method according to any of the claims 1 to 6 characterized in that said arrangement comprises on the broadcasting studio side a multiplexer/coder (MUXCC) in which the sub-channels (SC1, SC2,...SCn) with digital signals which are represent for multi-media documents are multiplexed in time and a control information is added said multiplexer/coder (MUXCC) is connected with a modulator (MO) for modulation the signal of the multiplexer/coder (MUXCC) into a transmission signal (TR) and said arrangement comprises on the receiving side a tuner (TU) connected with a transmission channel decoder (TCD) for demodulation, digitizing, demultiplexing and extracting control information from the bit stream and said transmission channel decoder (TCD) is coupled to a multi-media player (CDMM) for recording and reproduction the distributed documents according to the programming of the user.
8. Arrangement according to claim 7 characterized in that said multi-media player (CDMM) comprises a CD-I-Player with the capability to use CD-read-only and CD-writeable and comprises a remote channel interface(RCI) which offers the possibility for remote storage of multi-media documents.

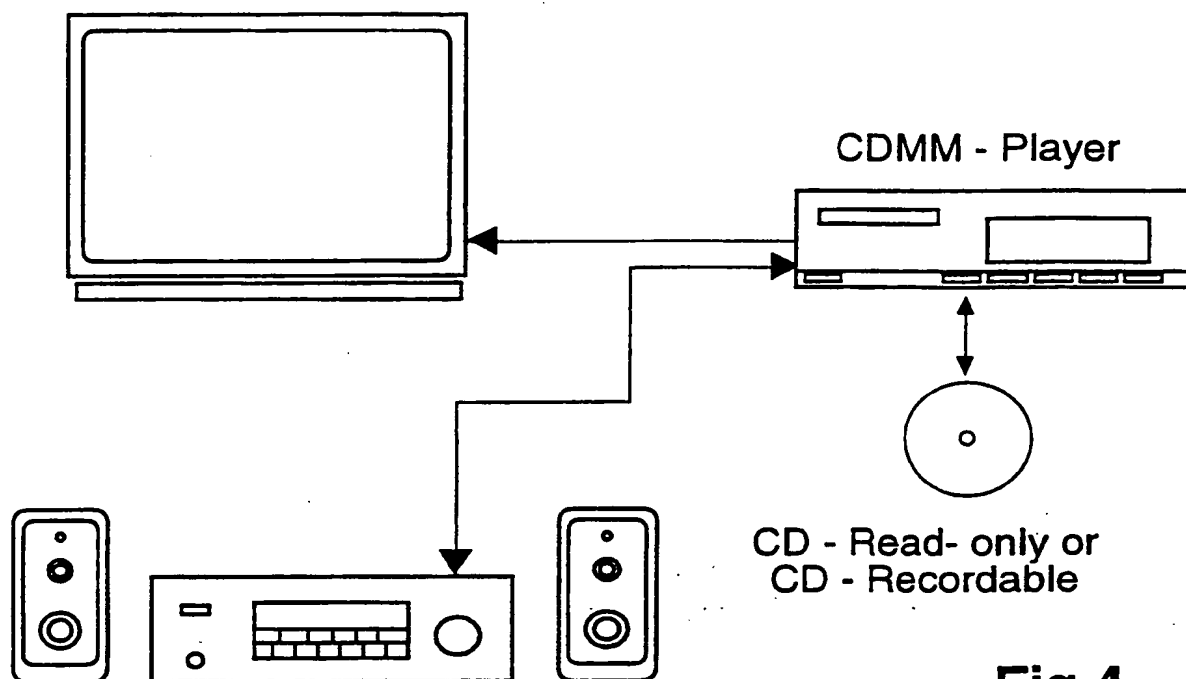
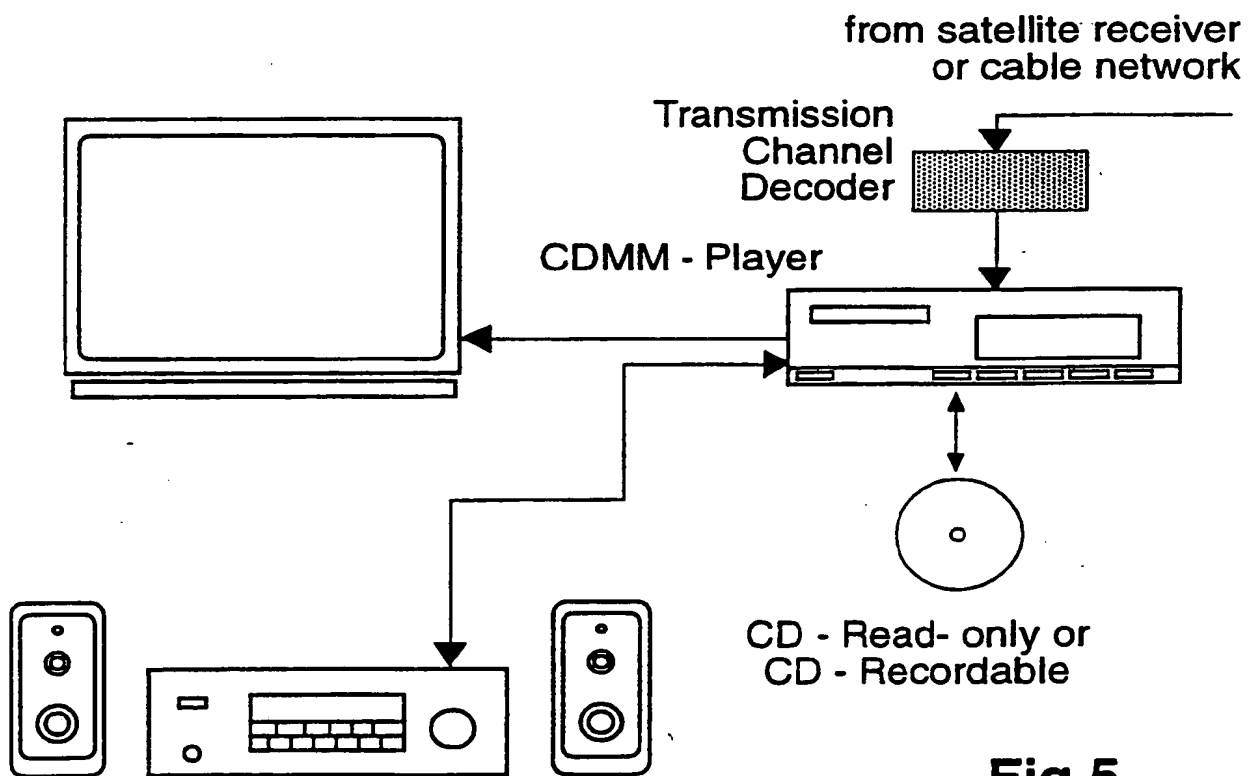
9. Arrangement according to claim 8 characterized in that said CD-I-Player with the possibility to use CD-writeable is a Magneto-Optical-Disc-Player.
10. Arrangement according to claim 7 characterized in that said multi-media player (CDMM) comprises a digital VCR.

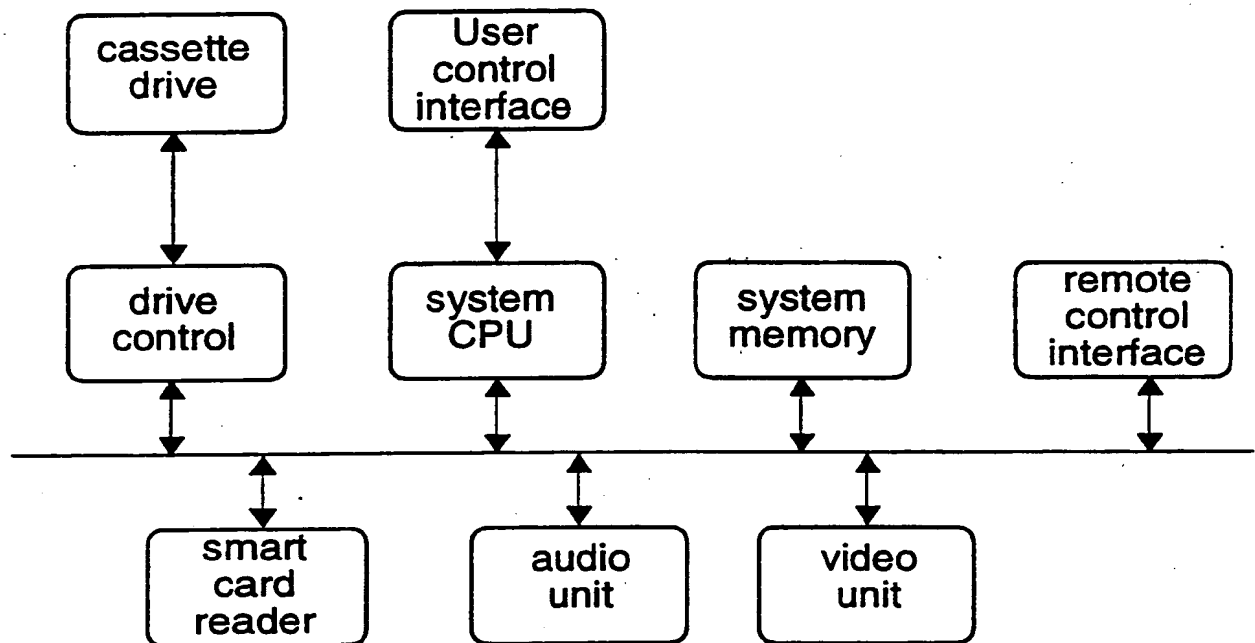


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**Fig.3**

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**Fig.4****Fig.5**

**Fig.6**



## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/EP 94/00287

A. CLASSIFICATION OF SUBJECT MATTER IPC 5 H04H1/00 H04N7/173 G11B20/10		
According to International Patent Classification (IPC) or to both national classification and IPC:		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) IPC 5 H04H H04N G11B H04L		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP,A,0 438 154 (CANON) 24 July 1991 see column 1, line 3-7 see column 4, line 39 - column 6, line 45 see column 13, line 18 - column 15, line 15 ---	1,5-7,10
A	EP,A,0 435 344 (CANON) 3 July 1991 see column 1, line 5-10 see column 3, line 52 - column 9, line 26 see column 10, line 55 - column 11, line 41 ---	1-3,5-8
A	PATENT ABSTRACTS OF JAPAN vol. 16, no. 583 (P-1462) 22 December 1992 & JP,A,42 032 656 (NEC) 20 August 1992 see abstract --- -/--	1,4-8
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "(O)" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search  13 May 1994		Date of mailing of the international search report  20.05.94
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tlx. 31 651 epo nl, Fax (+31-70) 340-3016		Authorized officer  Zanti, P

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## (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO,A,91 14265 (DEUTSCHE THOMSON BRANDT) 19 September 1991 see page 1, line 1-4 see page 2, line 3-21 see page 3, line 18 - page 4, line 6 see page 5, line 1 - page 8, line 7 -----	1,4,6-9

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

PCT/EP 94/00287

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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WO-A-9114265	19-09-91	DE-A- 4007814 AU-B- 639762 AU-A- 7345091 EP-A- 0573413 HU-A- 64430 JP-T- 5505275	19-09-91 05-08-93 10-10-91 15-12-93 28-12-93 05-08-93

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